

Abstract

This bachelor thesis deals with the possibility of using the variational principle in the search for internal solutions replacing singularities in static spacetimes. In the first instance, the thesis introduces the problematics on the simple case of classical Newton's gravity, where it also shows its practical application on several simple examples of symmetric potentials, and then it tries to generalize the theory for Einstein's gravity. It turns out that the relativistic problem could be loosely related to the so-called quadratic gravity as the internal solution is being found as a minimizer of a functional composed of quadrates of the Ricci tensor, the Weyl tensor and scalar curvature. Subsequently, it is verified that the newly presented theory in the newtonian limit yields the same results as the classical one. Finally, the thesis deals with the use of this theory to find an internal solution replacing the singularity in Schwarzschild spacetime and discusses its properties.